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2021

Rajalin , S , Pihlaja , P , Carter , A S & Rautakoski , P 2021 , ' Associations between social emotional and language domains in toddlerhood - the Steps Study ' , Journal of child language acquisition and development - JCLAD , vol. 9 , no. 2 , pp. 223-248 . < https://science-res.com/index.php/jclad/article/view/16 >

http://hdl.handle.net/10138/332848

Journal of Child Language Acquisition and Development – JCLAD
Vol: 9 Issue: 2 223-248, 2021, June
ISSN: 2148-1997

Associations between social emotional and language domains in toddlerhood – The Steps Study

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Received : 06.02.2021
Accepted : 10.06.2021
Published : 30.06.2021

Abstract

This research has highlighted a risk for social-emotional and behavioural (SEB) problems in children with developmental language disorder. Associations with delays in social-emotional competencies and language development have been found in both children with language delays and children with language disorders, but findings on the association between SEB problems and language delay in very young children are mixed. The purpose of this study was to explore whether there is an association between social-emotional competencies and SEB problems measured at 18 months and language skills measured at 2 years of age. In addition, background factors often related to language development were controlled statistically. The data were gathered from parents of 591 children with questionnaires in a Finnish cohort study (the STEPS study). Social-emotional competencies and SEB problems were assessed with Brief Infant-Toddler Social and Emotional Assessment (BITSEA) and language skills with MacArthur Communicative Development Inventories (CDI-T). The data were analysed with forced entry multiple linear regression analyses with three language variables (expressive vocabulary, grammar and M3L) as outcome variables and SEB problems, social-emotional competencies and background variables as independent variables.

Children with delay in social-emotional competencies in early toddlerhood according to the BITSEA cut-off scores had significantly smaller expressive vocabularies measured half a year later at 24 months of age than children with no delay in social-emotional competencies. SEB problems were not associated with weaker language skills. Child's sex was the most important background factor contributing to all of the language variables in favour of girls.

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Findings indicate that a delay in social-emotional competencies in early toddlerhood can be associated with a delay in development of expressive vocabulary in later toddlerhood. Language development of young toddlers with a delay or deficit in social-emotional competencies should be examined as early as possible to support language development when needed.

Keywords BITSEA, CDI, early language development, social-emotional competence, social-emotional problems

1. Introduction

Language and social-emotional development are interconnected in the early stages of a child's development. Social interaction with other people and sufficient exposure to language are prerequisites for language development (Tomasello, 2009). In interaction with adults, children are also socialized with respect to how to behave and how to read what others are conveying, which supports social-emotional development (Eisenberg et al., 2014).
For some children, language development does not progress in a typical way and many of them can have social-emotional and behavioural problems (SEB problems hereafter). The associations between these difficulties have been studied but results in young children are slightly contradictory.

1.1. Social-emotional competencies and problems

Social-emotional competencies refer to factors in social relationships with others such as attention skills, compliance, imitation and play behaviour, emerging empathy, and prosocial peer behaviours, which create a foundation for other social-emotional skills in children (Carter et al., 2003). The main elements of social-emotional competencies are emotional self-regulation, social problem solving and prosocial behaviour, which are important contributors to the child's effective and successful interaction with other people (Rose-Krasnor & Denham, 2009, 163–172). Social-emotional competencies develop in interaction with other people (Rose-Krasnor & Denham, 2009, 164). To be able to interact with others requires communication skills. In fact, good communication skills in toddlerhood have been associated with good social-emotional competencies (Haapsamo et al., 2012; Horwitz et al., 2003), and late talkers have been found to have more problems in these competencies than children with typical language development (Thurm et al., 2018).
Good social-emotional competencies are also important in preventing early-emerging SEB problems, because they help the developing child face the challenges met in interaction with others (Briggs-Gowan et al., 2001; Carter et al., 2003). On the other hand, children lacking age-appropriate social-emotional competencies may have a risk of developing SEB problems.
In previous research it has been observed that even young toddlers can have SEB problems, for example in a study conducted by Möricke et al. (2013) with young children at 14–15 months of age. The prevalence of SEB problems in toddlers was 12–16% in a study by Briggs-Gowan and colleagues (2001) and 16–18% in a study by Skovgaard and colleagues (2007). In a literature review by Brauner and Stephens (2006), the estimated

prevalence of these problems in children aged between 0 and 5 years ranged from 9.5% to 14.2%.

SEB problems are usually divided into three domains: externalising, internalising and dysregulation (Carter et al., 2003). Some externalising problems are expressed as difficulties with impulsivity, high activity and aggression or defiance. Almost every child shows some of these behaviours, but when these types of behaviours are too frequent and persistent it can cause problems (Carter et al., 2003). Internalising problems include e.g. depression, social withdrawal, fearfulness, worry, nervousness, and distress when separated. These behaviours belong to typical development but are considered problematic if they become too frequent and/or over-intense, and if the child has many co-occurring internalising problems (Briggs-Gowan & Carter, 2006; Carter et al., 2003).

Children start regulating their emotions as young as 6 months old by looking away or self-soothing, which lowers the child's negativity in frustrating situations (Eisenberg et al., 2014). Self-regulation has an important role in social development and is used to regulate negative emotionality and also behaviour. Poor self-regulation skills have been shown to predict weaker social skills later in life, especially for those who have a risk for developmental language disorder (Aro et al., 2012). Dysregulation problems have been defined as problems with negative emotionality, sleeping, eating, and sensory sensitivities (Briggs-Gowan & Carter, 2006; Carter et al., 2003).

1.2. Associations between difficulties in language development and social-emotional competencies and problems

Approximately 7% of children in kindergarten have a developmental language disorder (DLD) according to Tomblin et al. (1997). Typically, children with DLD have receptive problems in language comprehension (Montgomery et al., 2016) and tend to have delays in vocabulary growth (Fisher, 2017; Rice et al., 2010; Rice & Hoffman, 2015) and grammatical development (Rice et al., 2010). In addition, they tend to have lower levels of Mean Length of Utterance (MLU) measured in words and morphemes than children with typical language development (Rice et al., 2010). Language dimensions affected later in development are particularly syntax and morphosyntax (Rice et al., 2008).

Elevated risk for SEB problems in preschool and school-age children with DLD is well documented (see the meta-analysis by Yew & O´Kearney, 2013). Toddlers cannot be diagnosed with DLD, but they can be considered to have a delayed language development and are then called late talkers (Rescorla, 2002; Weismer, 2007, p. 86). Studies of SEB problems in younger children with language delay provide slightly contradictory results. Some have found elevated risk for SEB problems and poorer social-emotional competencies in these children compared with their typically developing peers (Henrichs et al., 2013; Irwin et al., 2002; Thurm et al., 2018). Other studies have found significant associations between delays in social-emotional competencies and delays in language development, but not with SEB problems (Horwitz et al., 2003; Rescorla et al., 2007).

Different hypotheses on the relationship of these associations exist. It has been suggested that language difficulties at an early age may have a negative influence on social interaction, which can lead to emotional and self-regulation problems (St Clair et al., 2019). According to the results of a longitudinal study by Roben, Cole and Armstrong (2013), children with weaker language skills and slower growth of them in toddlerhood had weaker skills in regulating anger than children with better language skills. Evidence in support of this theorised causal pathway is the observed association between language difficulties and increases in social problems with age (Clegg et al., 2015; St Clair et al., 2011). On the other hand, problems with adaptability and withdrawal have been found as early as at 9 months of age in children who have shown language difficulties later in preschool, indicating that SEB problems may possibly precede language problems (St Clair et al., 2019). Another hypothesis is that the association is bidirectional (Thurm et al., 2018). In addition, apart from a few studies that also included comprehension as a measurement (Clegg et al., 2015; Irwin et al., 2002; Thurm et al., 2018), usually the only language variable used in studies on this association is the size of expressive vocabulary. It is important also to measure other language variables in the studies to get a more comprehensive picture of the language skills of children when this association is studied.

1.3. Factors influencing language development

Several biological and environmental factors can influence early language development in children. The effect of biological sex on language development has been widely studied. There is evidence of toddler girls having a significantly larger expressive vocabulary and a faster expressive vocabulary growth than toddler boys (Eriksson et al., 2012; Fenson et al., 1994; Stolt et al., 2008). Toddler girls also combine words more than toddler boys in several language communities (Eriksson et al., 2012). However, in a meta-analysis by Fisher (2017), no significant associations between late talkers and child's sex were found. Additionally, children born preterm have a higher occurrence of language delay than full-term children (Barre et al., 2011; Gayraud & Kern, 2007; Schults et al., 2013; Stolt, 2009).

One area of interest for researchers has been the association between early language development and the socioeconomic status (SES) of the parents. In a meta-analysis by Fisher (2017), a small significant association was found between lower SES and a smaller expressive vocabulary. In previous studies, SES has been defined variously based on parent´s educational level, occupational status or income, but the results are nonetheless quite similar. Pungello et al. (2009) found that toddlers living in a family with a lower SES had slower development of expressive vocabulary than children of families with a higher SES. Fernald and colleagues (2012) reported a similar pattern in children as young as 18 and 24 months old. However, the effect sizes were small. Another demographic factor that has been shown to have a positive impact on the language development of infants and toddlers is young age of the mother (McNally & Quigley, 2014; Westerlund & Lagerberg, 2008). However, the results of some studies favour older mothers over younger ones (Keown et al., 2001; Sutcliffe et al., 2012). The differences in the results may

depend on the age range of mothers included and which background factors have been controlled for. For example, in the latter studies, more positive parenting behaviour of older mothers interrelated with language development.
Furthermore, studies exploring familial aggregation of language difficulties have found that children with language delay have a higher risk of having a family member who has experienced language difficulties in childhood (Keegstra et al., 2007; Zambrana et al., 2014).

1.4. The current study

The research described above has highlighted the risk for SEB problems in older children with a DLD diagnosis, but slightly contradictory results concerning this association can be seen in young children with delayed language development. In addition, the language measure used in previous studies has mostly been expressive vocabulary, with some exceptions including receptive vocabulary. Thus, it is important to add more language variables describing language skills when studying this relationship.
The purpose of the present study was to explore whether there is an association between social-emotional competencies and SEB problems measured at 18 months of age and the subsequent speech and language development measured at 24 months of age. The hypothesis was that children with SEB problems and/or delay in social-emotional competencies have weaker language skills than children with developmentally adequate social-emotional functioning. The second aim was to examine whether different background factors, often related to language development, have an effect on language skills in addition to SEB problems and social-emotional competencies. This study extends earlier research on the relationship between social-emotional competencies and SEB problems and language development in toddlerhood. An additional extension is the use of grammatical language variables along with expressive vocabulary when assessing language skills. If there is an association between SEB problems and lacking social-emotional competencies measured at 18 months of age and language skills measured at 24 months of age, it indicates that it would be beneficial to start supporting language development as soon as unfavourable socio-emotional difficulties can be detected.

2. Methodology

The study is part of a Finnish cohort study, Steps to the Healthy Development and Well-being of Children (the STEPS Study), which is a longitudinal, population-based multidisciplinary study of children born to mothers in an area of Southwest Finland during 1.1.2008–31.03.2010 (for more detail see Lagström et al., 2013). The cohort includes 9811 mothers and their 9936 children. The Ministry of Social Affairs and Health and the Ethics Committee of the Hospital District of Southwest Finland have approved the STEPS Study (27 February 2007).

2.1. Participants and sample selection

A subset of mothers in the cohort were recruited to participate in an intensive follow-up, either during the first trimester of pregnancy when visiting the maternity clinic or after delivery on the hospital ward. Altogether 1797 Finnish- and Swedish-speaking mothers with 1827 children accepted the invitation. The majority of them (76.8%) were recruited from a maternity clinic and about a quarter (23.2%) from the delivery hospital. Written informed consent was obtained from the parents.

In this study, Swedish-speaking and bilingual children were excluded and only Finnish-speaking children (N = 1370) were included, due to differences in the language structure between Finnish and Swedish. Families were asked to fill out two questionnaires, the Brief Infant-Toddler Social and Emotional Assessment (BITSEA; Briggs-Gowan & Carter, 2006) and MacArthur Communicative Development Inventories (CDI; Fenson et al., 1994). Altogether 704 families had filled out both questionnaires. The families had been instructed to fill out the BITSEA when the child was 18 months of age and the CDI when the child was 24 months of age. However, the ages of the children varied from 10 to 48 months upon completion of the BITSEA and 20 to 29 months for the CDI. To narrow the age range of the BITSEA assessment, children younger than 16 months and older than 20 months were excluded, as well as children whose age upon completion of the BITSEA questionnaire was missing.

Some children can experience a lexical growth spurt after 2 years of age (Clark, 2003), which is why only children aged 23–25 months upon CDI completion were included. Children younger or older than this age range upon CDI completion or whose age was missing were excluded. Children born prematurely (< 37 gestational weeks; Parikka & Lehtonen, 2017, p. 9) and children with missing information on gestational weeks were also excluded. Additionally, two outliers were excluded as they had a higher Competence score than was possible in the BITSEA questionnaire. The final sample included a total of 591 children. A flowchart of the inclusion and exclusion process is presented in Figure 1.

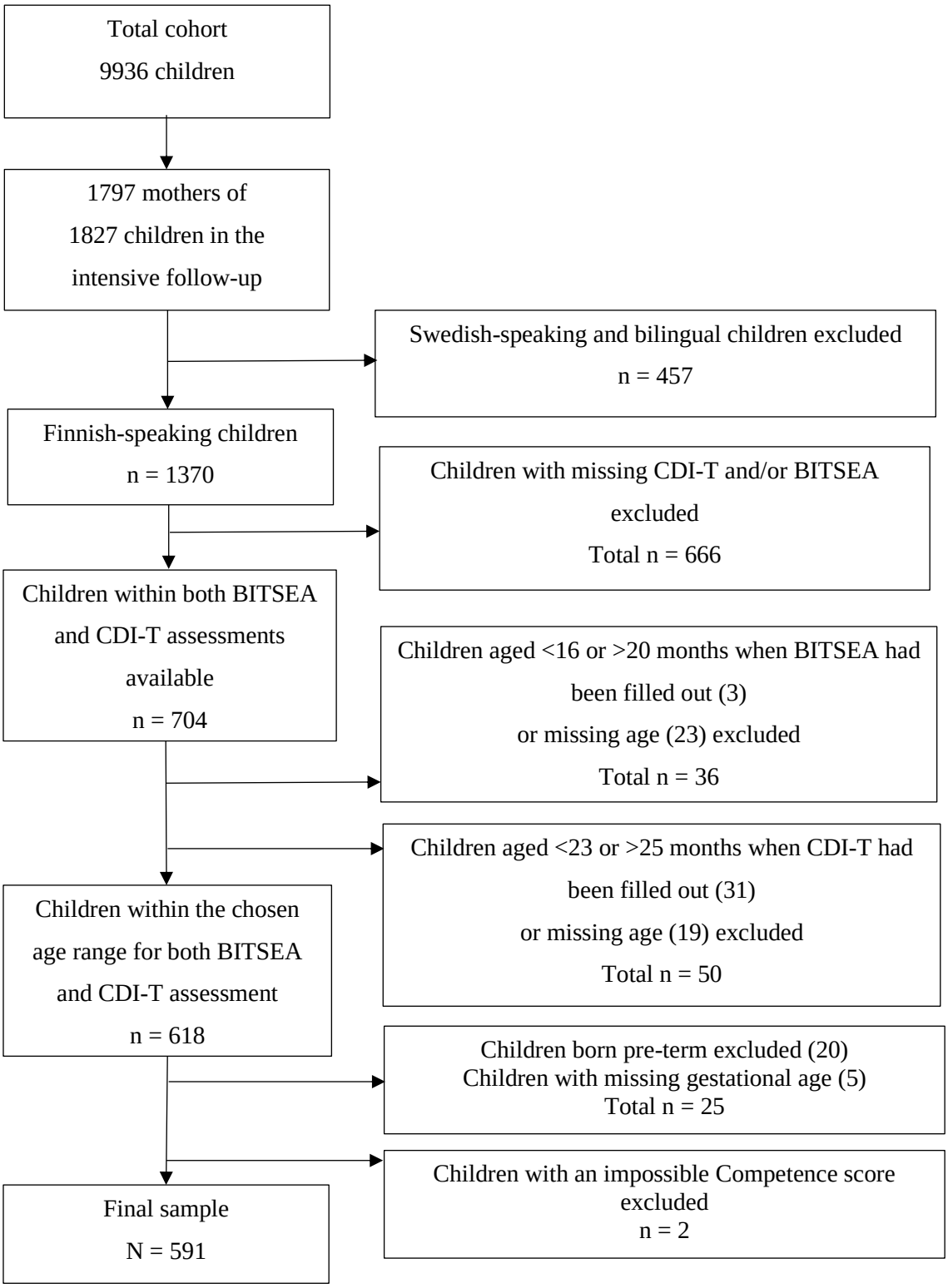

Figure 1. Flowchart of inclusion and exclusion criteria for the sample

There were 303 boys (51.3%) and 288 girls (48.7%) in the sample. Over half of the children had no siblings (55.0%), nearly a third had one sibling (29.9%), a tenth had two siblings (11.7%), and the remainder had between three and eight siblings (3.4%). Almost all parents were married (63.3%) or cohabiting (35.2%), with 1.5% reporting another status and five families this information was missing. The SES of the parents was defined in two categories based upon occupational status as at least professional or other. Those in high or intermediate positions were classified as professionals and those working in the service and industry sectors as other. Of the mothers 63.6% and of the fathers 58.0% were considered professionals. The family monthly net income was at least 3000 euro for 48.4% of the families and under 3000 euro for 51.4%; this information was missing for 11 families. The average net family earnings in Finland during the data gathering years was 3120 euro (2008) and 3173 euro (2009) (Statistics Finland's PX-Web databases). Out of the sample, 1.2% of the mothers and 2% of the fathers reported having had late onset of speech as a child. Other descriptive statistics are given in Table 1.

Table 1
Descriptive characteristics from data collected shortly after birth (N = 591)

Characteristic	***M***	***Mdn***	***SD***	***Min***	***Max***
Age of mother at birth	31.18	31.12	4.19	18.25	42.76
Age of father at birth[a]	33.02	32.41	5.17	18.35	55.78
Gestational days	280.57	281.00	8.54	259	299
Agpar (5 min)	9.05	9.00	0.81	5	10

[a]*Age missing for four fathers.*

2.2. Attrition

Due to dropouts from the cohort study and numerous exclusion criteria, the present study experienced high rates of attrition. To avoid attrition bias, we checked for any systematic difference in the background and outcome variables between participants and those who had been excluded. From the previous studies in this cohort, we know that mothers participating in the STEPS study were on average 7 months older when giving birth than mothers in the whole cohort population, and that the child participating was most likely their first. In addition, the couples were more likely married, and their occupational status was somewhat higher than in the cohort population (see Lagström et al., 2013). The participating families of the present study differed from non-participants with regards to two background variables (Table 2). The participating mothers were slightly older than non-participating mothers (31.18 vs 30.57 years) and were more likely to be married (63.3% vs 55.6%). The difference in gestational age was calculated without the premature children in excluded families because they were also excluded from the study sample.

Table 2
Comparison of characteristics of excluded and included study participants based on the chi-square test for categorical variables and t-test for numerical variables

	Variables	**Excluded participants[a]**	**Included participants[b]**	***p***
	Outcome variables			
	CDI-T, Expressive, mean (SD)	290.43(167.74)	300.14(164.14)	.510
	CDI-T, Grammar, mean (SD)	8.94(5.31)	9.34(5.23)	.400
	CDI-T, Morphosyntax, mean(SD)	6.09(2.70)	6.40(2.57)	.231
	Sociodemographics	(n=1236)	(n=591)	
Child	Gender; boys, %	52.4	51.3	.647
	Gestational days, mean (SD)	280.06(8.69)[c]	280.57(8.54)	.247
Mother	Age in years, mean (SD)	30.57(4.77)	31.18(4.19)	**.005**
	Marital status married, %	55.6	63.3	**< .001**
	First child, %	52.1	55.0	.164
	Late onset of speech, %	1.1	1.2	.799
	SES, occupational class; at least professional, %[d]	59.5	63.6	.119
Father	Age in years, mean (SD)	32.74(5.59)	33.02(5.17)	.289
	Late onset of speech, %	1.1	2.0	.130
	SES, occupational class; at least professional, %[d]	56.0	58.0	.474
Family	Family income; at least 3000e/month, %	44.3	48.6	.088

CDI-T = McArthur Communicative Development Inventories, Toddler-form
[a] (n=129–159); including only Finnish-speaking children aged between 23 and 25 months
[b] (n=498–591)
[c] (n=1101, premature children excluded)
[d] Classification: Professionals (in high positions, e.g. managerial, but also intermediate positions such as nurses) vs others [blue-collar workers (e.g. service and industry)]

2.3. Data collection and processing

Data were gathered from parents using questionnaires sent by post or electronically. One questionnaire was used to assess the child's social, emotional and behavioural problems and competencies at 18 months of age (BITSEA; Briggs-Gowan & Carter, 2006), and another to assess their language development at 24 months of age (CDI-T; Fenson et al., 1994). Further questionnaires assessed family demographics.

2.3.1. Questionnaires on demographic information

Demographic and other family-related information was collected from mothers during pregnancy weeks 10 to 15 with questionnaires sent out to the families. In addition, both mothers and fathers completed separate forms

at the 20th and 30th gestation weeks. Mothers recruited from the delivery ward completed the forms there. Additional information concerning the family and the child was gathered from one or both of the parents when the child was 13, 18 and 24 months of age. Questions concerned physical, psychological and social development of the child and demographic information of the parents. Background variables used as covariates in the present study were child's sex, gestational days, age of mother at childbirth, SES of the parents, and parent's self-reported history of late onset of speech.

2.3.2. Brief Infant-Toddler Social and Emotional Assessment (BITSEA)

The Brief Infant-Toddler Social and Emotional Assessment (BITSEA; Briggs-Gowan & Carter, 2006) used in this study is a parent-report screening tool to identify delays in social and emotional competencies, as well as potential social, emotional and behavioural problems in children between the ages of 12 months and 35 months and 30 days. It includes 42 items, of which 11 concern potential delays or deficits in social-emotional competencies and 31 cover externalising, internalising and dysregulation problems.

BITSEA has been shown to be a valid parental-report tool in measuring infants' and toddlers' social-emotional development (Bagner et al., 2012; Briggs-Gowan et al., 2001; Haapsamo et al., 2009; Pontoppidan et al., 2017). The Finnish translation of the BITSEA has been applied in a number of previous studies (Alakortes et al., 2017; Haapsamo et al., 2009; Paavola-Ruotsalainen et al., 2018). The results of the BITSEA give a Total Problem score and a Total Competence score. The maximum Total Problem score is 62 and the maximum Total Competence score is 22. Possible social-emotional and behavioural problems (SEB problems) and delays in social-emotional competencies is defined with certain clinical cut-off points in these scores depending on the age and sex of the child. A Total Problem score above the cut-off value indicates possible socio-emotional and behavioural problems and a Total Competence score below the cut-off value indicates a possible delay or deficit in social-emotional competencies. For children aged 12–17 months the Total Problem cut-off score is 13 for both sexes, and for children aged 18–23 months it is 13 for girls and 15 for boys. The Total Competence cut-off score for children aged 12–17 months is 12 for both sexes, and for children aged 18–23 months it is 14 for both sexes.

2.3.3. MacArthur Communicative Development Inventories (CDI)

The Finnish version of the McArthur Communicative Development Inventories, Toddler-form (CDI-T; Fenson et al., 1994) was applied in the present study (Lyytinen, 1999). It is a parent-report questionnaire aimed to assess the child's communicative and language development. CDI-T is intended for children aged 16–30 months and includes sections measuring expressive vocabulary and covering grammatical and morphological development. The expressive vocabulary section includes 595 words in 20 different categories and parents are asked to mark the words the child both understands and produces. The grammar section includes questions about the child's use of plural, case suffix, verb conjugation and word combinations, with maximum points of 16. Morphosyntax is measured as a mean number of morphemes in the child's three longest utterances (M3L)

(Fenson et al., 2007). MacArthur Communicative Development Inventories have been shown to be a valid parent-report instrument for measuring early communication and language development in children (Fenson et al., 1994, 2007; Lyytinen, 1999). When the Finnish CDI-T was validated, the expressive vocabulary of children aged 18 months correlated statistically significantly with the Reynell Developmental Language Scales (RDLS; Edwards et al., 1997) expressive scale (r = .85, p < .001) and receptive scale (r = .35, p < .001). At 24 months of age the expressive vocabulary in CDI-T correlated with Baileys Mental Developmental Index (r = .70, p < .001) and Baileys Scales of Infant Development (naming tasks) (r = .59, p < .001) (Lyytinen, 1999).

2.4. Data analysis

Parametric tests were applied when analysing the data, and we used the Statistical Package for the Social Sciences (SPSS) version 25.0 for Windows (IBM Corporation, Armonk, NY, USA). P-values < 0.05 were considered statistically significant. Independent samples t-tests were conducted to examine group differences between boys and girls in total scores from the BITSEA and CDI-T. Additionally, t-tests demonstrated the difference in mean scores between the two age groups. The association between SEB problems and social-emotional competencies at 18 months of age and language skills at 24 months of age was analysed with multiple linear regression analyses. Three separate forced entry multiple linear regression analyses were performed with (1) expressive vocabulary, (2) use of grammar and (3) M3L as the outcome variables. The background variables included in the analysis were sex of the child, maternal age, gestation days, mother's SES, father's SES, mother's history of late onset of speech and father's late onset of speech.

The children included in the present study were between 16 and 20 months of age when the parents filled out the BITSEA form. According to the manual, there are different cut-off points for total scores of children aged 12–17 months and children aged 18–23 months. Therefore, the Total Problem scores and Total Competence scores were reported for two different age groups in the descriptive statistics. Because after this conducted cut-off procedure takes into account the age and sex of the child, the children could be divided into two groups with and without SEB problems, as well as into two groups with and without delay in social-emotional competencies. These variables were entered as independent variables in the regression analysis along with background variables that could potentially influence the language outcome variables. The correlations between the independent variables and all three language outcomes were examined before the regression analysis was conducted, to check for any correlations that could have an effect on the regression model. Child's age at the time of filling out the BITSEA and CDI-T questionnaires varied and therefore these ages were added as covariates into the regression model.

3. Findings

3.1. Descriptive statistics

Descriptive statistics of Total scores in the BITSEA are presented in Table 3. There was no statistically significant difference in the problem scores of children aged 16–17 months (M = 8.29, SD = 5.00) and those aged 18–20 months (M = 7.95, SD = 4.79) and no sex differences in Total Problem scores. For the Total Competence score, girls had a significantly higher Total Competence score (M = 17.80, SD = 2.43) than boys (M = 16.91, SD = 2.56) in the group of children aged 16–17 months ($t(413) = 3.71$, $p < .001$, d = 0.357) but not in the group of 18–20 month-olds.

Table 3
Total scores of the BITSEA questionnaire for each of the age groups and sexes (N = 588[a])

	16–17 months			**18–20 months**		
SEB statistic	Total (n = 414)	Girls (n = 197)	Boys (n = 217)	Total (n = 174)	Girls (n = 90)	Boys (n = 84)
Total Problem score[b]						
M	8.29	8.47	8.12	7.95	7.64	8.27
Mdn	8.00	8.00	7.00	7.00	7.00	7.00
SD	5.00	5.04	4.97	4.79	4.81	4.77
Range	0–34	0–34	0–26	0–29	1–29	0–25
Total Competence score[c]						
M	17.34	17.80	16.91	17.39	17.64	17.11
Mdn	18.00	18.00	17.00	18.00	18.00	17.50
SD	2.54	2.43	2.56	2.55	2.34	2.75
Range	10–22	11–22	10–22	7–22	12–22	7–22

[a] Three participants were missing a Total Problem Score
[b] Max 62, [c] Max 22

According to the BITSEA cut-off scores, 16.6% (n = 98) of the children were considered to have SEB problems and 6.9% (n = 41) delays in social-emotional competencies.

The descriptive statistics of the CDI-T results are shown in Table 4. The results show that there was a statistically significant difference in expressive vocabulary between girls (M = 354.03, SD = 144.50) and boys (M = 283.57, SD = 155.53; $t(588.528) = 6.08$, $p < .001$, d = 0.469). Girls also had higher scores on average in the grammar section (M = 11.29, SD = 4.31) than boys (M = 8.95, SD = 5.96; $t(518.492) = 6.48$, $p < .001$, d = 0.450). The mean number of morphemes in the three longest utterances the children had produced was also slightly higher for girls (M = 6.86, SD = 2.35) when compared to boys (M = 5.73, SD = 2.52; $t(496) = 4.60$, $p < .001$, d = 0.464).

Table 4
Descriptive statistics of CDI-T including total scores and scores for each of the sexes

Language outcomes	***n***	***M***	***Mdn***	***SD***	***Range***
Expressive vocabulary[a]					
(all children)	591	300.14	329.00	164.14	4–595
Girls	288	354.03	385.50	144.50	4–595
Boys	303	284.57	297.00	155.53	9–579
Grammar (all children)[b]	526[c]	9.34	10.00	5.23	0–16
Girls	258	11.29	12.50	4.31	0–16
Boys	268	8.95	8.00	5.96	0–16
M3L (all children)	498[d]	6.40	6.42	2.57	0–15.67
Girls	255	6.86	7.00	2.34	0–13
Boys	243	5.73	5.670	2.52	0–15.67

[a] *Max 595*
[b] *Max 16*
[c] *65 participants were missing a total grammar score*
[d] *93 participants were missing data on M3L*

3.2. Results of multiple linear regression analyses

To analyse the possible associations between SEB problems and social-emotional competencies and language skills, the categorical variables of SEB problems and social-emotional competencies, created with the cut-off score procedure, were used. Separate forced entry multiple linear regression analyses were conducted with expressive vocabulary, use of grammar and M3L as outcome variables. SEB Problems and social-emotional competence variables were included in the model as independent variables. Additionally, the background variables sex of the child, maternal age when giving birth, gestational days, SES of both the mother and the father, as well as late onset of speech of mother and father were included to control for variables known to influence language outcomes. Age of the child at the time of filling out the CDI-T and BITSEA questionnaires were added as covariates to control for child's age affecting the results.

An examination of correlations revealed that none of the independent variables were highly correlated with each other. The collinearity statistics between independent variables were all within accepted limits (tolerance > 0.1, Field, 2009, p. 224) and therefore the assumption of multicollinearity was met.

3.2.1. Expressive vocabulary

Table 5 shows the results of the multiple linear regression analysis with expressive vocabulary as the dependent variable. A statistically significant regression equation was found ($F(11, 432) = 5.94$, $p < .001$) and accounted for 13.1% of the variance in the outcome variable ($R^2_{adj} = 0.109$). There was a significant association between social-emotional competence and expressive vocabulary ($\beta = -.131$, $p = .005$), indicating that children with a delay in social-emotional competencies had a mean expressive vocabulary of 83 words fewer than children with developmentally appropriate social-emotional competencies. SEB problems did not significantly contribute to the variance in expressive vocabulary.

In addition, one of the background variables that significantly contributed to the model was sex of the child ($\beta = .232$, $p < .001$), meaning girls had on average 76 words more in their expressive vocabulary than boys. Another significant variable was father's SES ($\beta = .124$, $p = .010$), which suggests that children with a father with a higher SES produced on average 41 words more than children with a father with a lower SES. Father's late onset of speech ($\beta = -.111$, $p = .016$) also had a significant association with the expressive vocabulary, suggesting that children with a father who had a history of late onset of speech as a child on average had an expressive vocabulary of 117 words fewer than children with a father without a history of delay in speech development.

A multiple regression analysis was conducted to examine whether an interaction effect was present between the sex of the child and social-emotional problems and competencies on expressive vocabulary. The results revealed no evidence of a statistically significant interaction effect between the sex of the child and social-emotional problems on expressive vocabulary. However, a statistically significant interaction effect was observed between sex and social-emotional competencies on expressive vocabulary, F (1, 588) = 4.446, p = .035, and accounted for 8.7 % of the variance.

Table 5
Coefficients for the forced entry multiple regression with expressive vocabulary as the dependent variable

	Dependent variable: Express. vocabulary			
Predictors	***B***	***SE B***	***B***	***Sig.***
Sex	76.132	14.803	.232	.000
Mother's age	-3.489	1.833	-.087	.058
Gestational days	-.418	.901	-.021	.642
Mother's SES	27.956	16.300	.082	.087
Father's SES	41.307	15.936	.124	.010
Mother's late onset of speech	41.836	64.234	.029	.515
Father's late onset of speech	-117.081	48.350	-.111	.016
Age when CDI-T completed	9.046	12.297	.033	.462
Age when BITSEA completed	9.991	9.063	.051	.271
SEB Problems	-16.254	20.127	-.037	.420
Social-emotional competence	-83.165	29.320	-.131	.005

3.2.2. Grammar and morphosyntax

A forced entry multiple linear regression analysis was conducted with grammar as the dependent variable. Independent variables included the social-emotional competence and SEB problems, as well as control variables as in the previously mentioned regression analysis. A statistically significant regression equation was found in the regression model, (F(11, 381) = 4.20, p < .001) and accounted for 10.8% of the variance (R^2_{adj} = 0.082). Neither SEB problems nor social-emotional competence proved to be predictors for grammar (Appendix A). The only variable that significantly predicted grammar was sex (β = .256, p < .001), suggesting that girls on average scored 2.7 points higher than boys.

Another forced entry multiple linear regression was conducted with morphosyntax as the dependent variable and the same independent variables as in the previously mentioned multiple regression analysis. A statistically significant regression model was found (F(11, 364) = 4.18, p < .001) and accounted for 11.2% of the variance in the dependent variable (R^2_{adj} = 0.085). Neither SEB problems nor social-emotional competence predicted morphosyntax but several sociodemographic variables did (Appendix B). These were sex of the child (β = .218, p < .001), maternal age (β = -.115, p = .024), mother's SES (β = .104, p = .049), father's SES (β = .148, p = .005), and father's late onset of speech (β = -.107, p = .032).

4. Discussion and conclusions

The aim of this study was to explore whether there is an association between social-emotional competencies and behavioural problems measured at 18 months of age and the early speech- and language development measured at 24 months of age. The hypothesis was that children with SEB problems or delay in social-emotional competencies have weaker language skills than children with developmentally adequate social-emotional functioning. In addition, the effect of different background variables was controlled for.

Language outcomes of CDI-T seemed to coincide with the normative data of the standardization study of the Finnish adaptation of the CDI by Lyytinen (1999), apart from the expressive vocabulary, which was slightly larger for the children in the present study. However, it was well in accordance with a more recent Finnish study by Stolt et al. (2008). Number of morphemes was in accordance with Finnish normative data (Lyytinen, 1999) and another Finnish study by Stolt (2009).

Mean scores of the BITSEA were very close to those in other Finnish studies with children aged 18 months (Alakortes et al., 2015; Haapsamo et al., 2009; Paavola-Ruotsalainen et al., 2018). However, the percentage of children with SEB problems (16.6%) according to the cut-off points was slightly higher and the percentage of children with delays in social-emotional competencies (6.9%) clearly lower than in other Finnish studies. The reason for this could be the wider age range when the BITSEA form was filled out in this study. Another reason could be that premature children, who often have some delays in development, were excluded from the sample. However, in spite of the lower percentage of children with delays in social-emotional

competencies in the present study, an association between having low scores in this domain and expressive vocabulary at 24 months of age was observed.

4.1. Associations between social-emotional competencies and problems and language skills in toddlerhood

According to the results, there was a statistically significant association between social-emotional competencies in early toddlerhood and expressive vocabulary measured half a year later, which partly supports the hypothesis. Children with a delay in social-emotional competencies had smaller expressive vocabulary than children without a delay in these competencies. However, this association was not present for the two other language variables, grammar and mean length of utterance. There were no associations between SEB problems and the three language variables measured. Thus, the hypothesis that SEB problems would also have associations with weaker language skills, was not supported.

The results of the present study are in accordance with those of Horwitz et al., (2003) and Rescorla et al., (2007), with no associations between language delay and SEB problems in toddlers but rather an association between language delay and delay in social-emotional competencies. Many other studies have also found significant associations between delays in social-emotional competencies and difficulties in language development, but also associations with SEB problems occurring simultaneously (Henrichs et al., 2013; Irwin et al., 2002; Longobardi et al., 2016; Thurm et al., 2018).

It is possible that social-emotional competencies have a close relationship with language development, and this is why toddlers with a delay or deficit in social-emotional competencies have a risk of delayed vocabulary development. Language is acquired in social interaction with others (Tomasello, 2009). Delayed social-emotional competencies can hinder interaction and reduce opportunities to learn language from communication partners. Social-emotional competencies include skills such as attention skills, following instructions, play behaviour and prosocial interactions with peers (Carter et al., 2003), all needed for social interaction where speech and language are used and learned. On the other hand, it is possible that delays in both domains are present already at an early age. It is difficult to draw conclusions on how these factors influence each other if the measuring points are not several and concordant, which was missing from the present study.

The result concerning the lack of an association between SEB problems and weaker language skills is in conflict with many previous studies, which have demonstrated this association in toddlers (Henrichs et al., 2013; Irwin et al., 2002; Paavola-Ruotsalainen et al., 2018; Thurm et al., 2018; Tervo, 2007). The difference may be due to grouping of the children into two groups with delayed language development and typical language development in almost all of the previous studies, which was not done in the present study. Another reason could be that because of the large variation in language development in children at 24 months of age, some of the children with weaker language skills might have belonged to the lower end of the normal variation without manifesting any SEB problems. The results and knowledge from previous research indicate that social-emotional competencies are important skills

needed in language development, and if there is a delay in these skills it can be a risk factor for development of language disorder, and for progression to SEB problems (Carter et al., 2003).

Grammatical and morphosyntactical development did not show any statistically significant associations with social-emotional competencies or SEB problems. Finnish-speaking children begin using a few grammatical expressions, such as the plural and the genitive, at about 18 months of age, increasing towards 2 years of age, and use them even more between 2 and 3 years of age (Stolt, 2009). Language abilities of the participating children were measured when they were between 23 and 25 months of age. The range of scores in these language skills varied from 0 to maximum regarding grammar and from 0 to quite a high number of M3L, which is a mean number of morphemes in children's three longest utterances. The wide variation in language development, even in children with typical development at this age, may mean that even though some of the children with weaker results in these language variables had a slower language development, they still had good social-emotional competencies and no SEB problems. This could possibly explain why weaker skills in grammar and morphosyntax did not have a significant association with either SEB problems or delays in social-emotional competencies. It is also possible that these types of language measures are not effective to differentiate children with language delay at this age, because these skills do not develop further until after 2 years of age.

4.2. Associations between demographic factors and language development

Several demographic and environmental factors contributed to language variables in addition to social-emotional competencies, but in somewhat different ways depending on the language variable. Child´s sex contributed to all language variables studied, in favour of girls. This result is in accordance with the findings of Fenson et al. (1994; 2007) and of a study by Eriksson et al. (2012) conducted in 10 non-English language communities, as well as studies by Lyytinen (1999) and Stolt et al. (2008) with Finnish children.

In addition to child's sex, father's SES and late onset of speech contributed to the size of the expressive vocabulary. Children of fathers with higher SES had a larger vocabulary than children of fathers belonging to the lower SES category. Korpilahti et al., (2016) also found that father's as well as mother's SES had significant links to the toddler's language development. Çakır (2016) found that fathers with high SES provide more language input and more open-ended questions when playing with toddlers, which subsequently increases the child's conversational participation, hence supporting language development positively. A significant effect of paternal language input on toddler's vocabulary has also been observed in a study by Reynolds et al. (2019). It is possible that these fathers interact with their children in a way that stimulates their language development.

Similar results as in the present study on the effects of parent's own history of language disorders have been observed in previous studies on familial

aggregation. Results have shown that children with language delay are significantly more likely to have a family member with a history of language difficulties than children with typical development (Keegstra et al., 2007; Zambrana et al., 2014; Zubrick et al., 2007). A potential explanation for why the mother's history of language delay did not have a significant association with language development in children in the present study could be the small number of mothers reporting such a delay in their own language development.

Child's sex was the only background factor contributing to the use of grammatical expressions, but there were several background factors which contributed to skills in morphosyntax. These factors were child's sex, father's late onset of speech, both father's and mother's SES, and mother's age. Just as fathers in the higher SES group may have a more stimulating way of interacting with their children (Reynolds et al., 2019), so may mothers with higher SES also have a different way of talking with their children, which has a positive effect on language development. Pan et al. (2005) found that mothers with higher SES used more varied word types in their child-directed speech than mothers with lower SES. Mother's age was one of the contributing factors to morphosyntactic development. Children of younger mothers produced on average slightly longer utterances. Over half the participating children were firstborns in their families. It is possible that mothers of firstborns were younger than those who already had several children, and that this caused some bias in the data. In addition, mothers of firstborns have, for example, been found to participate more in shared reading than mothers with several children (Westerlund & Lagerberg, 2008), which could indicate that they also spend more time fostering other types of interactions with their children that stimulate their language development. Families with older mothers may already have more than one child, and the mother needs to share her time with all of them. It is possible that time spent interacting with the youngest child has been less than for younger mothers who possibly had only one child.

4.3. Limitations of the study and recommendations for future research

One of the strengths of this study is the large sample size and the amount of data collected. However, the study also has some limitations to be considered when interpreting the results. Because this was a cross-sectional study measuring social-emotional competencies and problems and language skills at different time points half a year apart, we cannot interpret the results as showing a causal relation between delays in social-emotional competencies and later-observed weaker vocabulary in some of the children. It can only be concluded that there is an association between social-emotional competencies and expressive vocabulary development in toddlerhood. Further research is needed to see whether the association persists and to find the possible developmental trajectory between delays in social-emotional competencies and language development. In the future, it would be important to study these associations longitudinally, measuring all these factors concurrently and several times during the developmental stage.

One limitation of the study was the wide variation in age of the children upon completion of the BITSEA questionnaire. Although parents had been

asked to complete the parental report when the child was 18 months old, many of them did so earlier or later; thus children aged 16–20 months had to be included to maximise sample size. This was, however, considered by using age- and sex-matched cut-off points when defining groups with and without a delay in social-emotional competencies and SEB problems, and including child's age upon completion of the BITSEA questionnaire as a covariate in the regression model.

Relying solely on parent reports to measure both social emotional problems and competencies and language development was also a limitation of this study, but because of the large sample size it was not possible to meet all of the children to conduct objective tests. On the other hand, both the methods we used have been shown to be valid measures of parent reporting.

When it comes to the background variables studied, the number of parents with a history of late onset of speech was considerably lower than expected, possibly because they may not be aware of having had difficulties in language development as a child.

4.4. Conclusion

There is an association between social-emotional competencies and early language skills in toddlerhood, but there are other contributing factors, primarily the child's sex. The findings of this study indicate that a delay in social-emotional competencies during the second year of life can be associated with a smaller expressive vocabulary at 24 months of age. Regarding clinical work, the results set a foundation for a recommendation to examine language development of young toddlers with a delay or deficit in social-emotional competencies, to be able to support their language development as early as possible when needed. This is especially important for children who also have other risk factors potentially influencing their language development.

Acknowledgements

We are grateful to the Finnish National Agency for Education and to the foundation C G Sundells stiftelse for their financial support for conducting this study and preparation of the paper. We also wish to thank Professor emerita Pirjo Korpilahti for her collaboration in gathering data, and all the families who took part in the study, the midwives for their help with recruiting participants, and the entire STEPS Study team. Additionally, we would like to thank statistician Anne Kaljonen for her excellent advice, and Adelaide Lönnberg for providing language help.

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Appendices

Appendix A

Coefficients for the forced entry multiple regression with grammar as the dependent variable

	Dependent variable: Grammar			
Predictors	***B***	***SE B***	***β***	***Sig.***
Sex	2.671	.509	.256	.000
Mother's age	-.110	.062	-.088	.077
Gestational days	-.006	.031	-.010	.837
Mother's SES	1.044	.559	.097	.062
Father's SES	1.001	.547	.095	.068
Mother's late onset of speech	1.691	2.078	.040	.416
Father's late onset of speech	-2.479	1.647	-.075	.133
Age when CDI-T completed	.001	.419	.000	.997
Age when BITSEA completed	.336	.306	.054	.274
SEB Problems	-.259	.689	-.019	.707
Social-emotional competence	-.801	.987	-.041	.417

Appendix B

Coefficients for the forced entry multiple regression with M3L as the dependent variable

	Dependent variable: Morphosyntax			
Predictors	***B***	***SE B***	***β***	***Sig.***
Sex	1.085	.249	.218	.000
Mother's age	-.070	.031	-.115	.024
Gestational days	.003	.015	.011	.832
Mother's SES	.544	.275	.104	.049
Father's SES	.749	.266	.148	.005
Mother's late onset of speech	-.340	.993	-.017	.732
Father's late onset of speech	-1.748	.813	-.107	.032
Age when CDI-T completed	.183	.204	.045	.369
Age when BITSEA completed	.239	.156	.078	.125
SEB Problems	-.171	.333	-.026	.608
Social-emotional competence	-.462	.514	-.045	.369